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ABSTRACT

This is one of a series of monographs developed by teachers in elementary schools near Leeds, England. This document focuses on early instruction of number concepts. It is considered essential that these ideas be presented first in concrete form. The working group attempted to provide a detailed progression in the developmental stages leading to the child's appreciation of the full meaning of the "fiveness of five." Activities are included on relationships and early matching, sorting, matching experience leading to an appreciation of one-to-one correspondence, comparing and ordering, and names and numbers. (MNS)

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VOL 6

MATHEMATICS- AN APPROACH FOR SLOW LEARNERS

SECTION 2

THE BEGINNINGS OF NUMBER

LEEDS EDUCATION AUTHORITY

MATHEMATICS CURRICULUM STUDY GROUP

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VOL. 6 - MATHEMATICS - AN APPROACH FOR SLOW LEARNERS

SECTION 2 - THE BEGINNINGS OF NUMBER

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January, 1981

THE BEGINNINGS OF NUMBER

Introduction

"Throughout history man has been trying to perfect a good means of counting and doing mathematical problems"

C. E. Drew
Modern Mathematics in the
Junior School.

Number is an abstract idea. Children are exposed to number very early in their education, but if they are to fully appreciate number concepts it is essential that these ideas be first presented in concrete form.

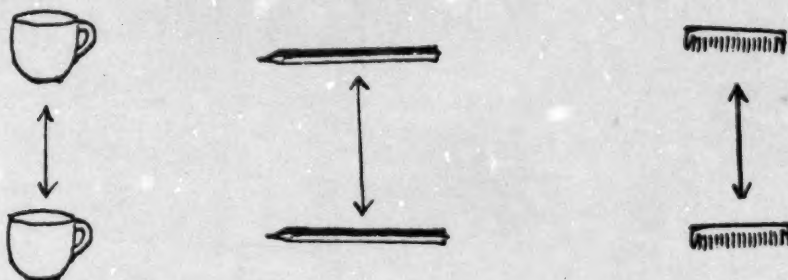
Many children find great difficulty in assimilating basic number ideas and it was with these children in mind that the Mathematics Working Group began its discussions. In this booklet the working group has attempted to provide a detailed progression of the developmental stages leading to the child's appreciation of the full meaning of the "fiveness of five".

Long familiarity blunts an adult's appreciation of the difficulty many children experience; it cannot be an easy task for the child to come to an appreciation of true number quality, unaffected by shape, colour, size or arrangement.

The suggested progression and activities which follow result from the deliberations of a working party of teachers and advisers over a period of twelve months. This study involved working with children in the classroom, observing and recording their reactions during activities involving number. Inevitably this work led to the modification of certain preconceived ideas held by the group.

1. RELATIONSHIPS AND EARLY MATCHING

- a) Match two identical objects with explanation that they go together because they are the same/like each other.
Use everyday objects which the children are familiar with e.g. beakers, pencils, crayons, comb, brush, scissors, milk bottle.
- b) Hold up one object and ask the child to match it to one of a group of three objects already placed on the table in front of him.
Continue use of everyday objects as above, then use realistic models e.g. toy cars, model furniture, dolls, tea-set.
- c) Lay a collection of three objects out and provide the child with an identical collection to match.



It is important for the teacher to ensure that the reason for their being matched is obvious.

- d) Use of Philograph 'real life' plastic shapes (see apparatus list at end of booklet). These can be matched to each other and can also be matched to identical sticky shapes mounted on card. The objects are coloured red, blue, green, orange and yellow. The sticky shapes can be arranged on large cards and identical shapes stuck on smaller cards to be used for matching. Philograph rubber stamps can be used to make identical matching cards and these eliminate the use of colour.
- e) Empty matchboxes for matching activities. Identical pictures can be put on the inside and outside of the boxes. The insides and outsides of the boxes can be mixed up on the table and the children are asked to put together the boxes. Coloured or plain pictures can be used.

2. SORTING

- a) Provide a group of objects and ask the child to take out those which are identical until the objects are all sorted into groups. At this stage the activity is teacher directed.
- b) Repeat a) with the child gradually making his own selections. Continue the activity starting with only two or three different groups, moving up to six or more. Use four to six objects in each group.

e.g. 4 red cars
4 red beakers
to 6 blue cars
6 " beakers
6 " combs
6 " model chairs
6 " pencils
6 " building bricks

Once again careful use of objects is important, not using more than one attribute.

Introducing colour and size. Use objects which are identical apart from the colour or the size

e.g. For colour - red, blue, yellow beakers.
For size - large and small toy cars.

- c) Move on to objects which are similar but not identical
e.g. groups of different pencils, groups of different bricks etc.
- d) Give the child a group of objects to sort and ask him/her to find all the red things, all the pencils, all the big ones, etc.

This would lead to the child sorting without guidance. How and why he/she sorted them in a certain way could then be discussed to check understanding of various attributes and find out where help is needed.

Play situations provide many opportunities for sorting activities to be carried out. e.g. Model farm - pigs in one field, cows in another.

3. MATCHING EXPERIENCE LEADING TO AN APPRECIATION OF 1-1 CORRESPONDENCE.

This experience is first gained through activity and the use of concrete materials. For example:

Hanging their own coats on their own pegs.

Sitting on their own chairs.

Setting out a knife, fork and spoon for each child.

Giving each child a pencil.

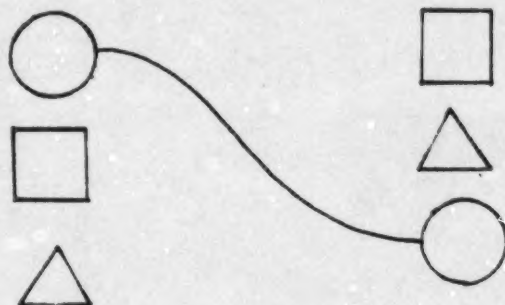
Putting a straw in a bottle of milk.

Putting a peg in a hole.

The children may record matching activities using banda sheets.

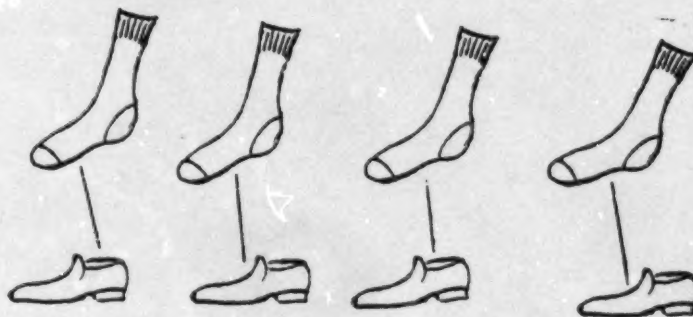
For example:

Drawing a line to join two identical shapes.



Drawing lines to join two related shapes.

— Sock to shoe.



cont'd...

Hats to heads



Bats to balls

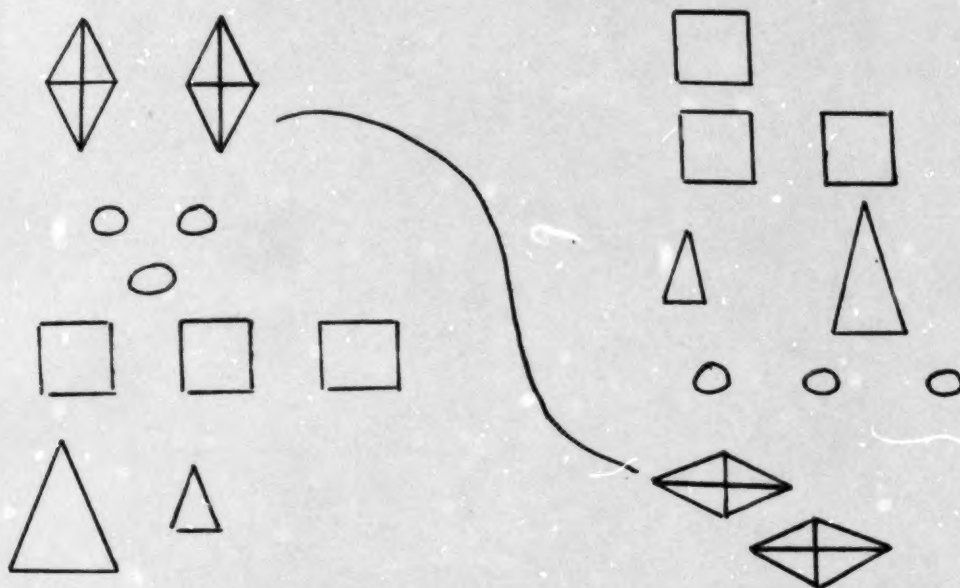


Further examples could include:

- cups to saucers
- keys to doors
- birds to nests
- sails to boats
- umbrella tops to handles
- ribbons to girls
- dogs to kennels
- lids to teapots

Rubber stamps can prove an asset to the non-artistic teacher.

Groups of objects or shapes may be matched to another group of identical shapes in a different arrangement. For example:



4. COMPARING AND ORDERING

- a) Using the idea of 1 - 1 correspondence to show that some sets are larger/smaller (greater than/less than) others.

This can be done using apparatus in the first instance.

e.g. The limit of the set being a hoop or a piece of string or wool.

This activity can be recorded on banda sheets.



- b) Placing sets in order of size - after comparing.

- c) . Objects and actions.

- Objects in order of size, age, colour etc.
- Actions leading to 1st, 2nd, 3rd etc.

5. NAMES AND NUMBERS

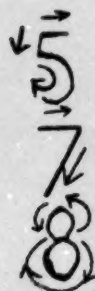
Once children can count out and name the number of different sets of objects written numbers may be introduced. This is an important stage in the child's development demanding practical experience of counting out successive sets of objects and matching each of them with the appropriate number symbol.

Writing Number Symbols

Begin by tracing over the symbols first with a finger then a pencil.

Children must be helped to form the numbers correctly from the start, always beginning at the top.

It is a help to talk to the child through the actions. For example:



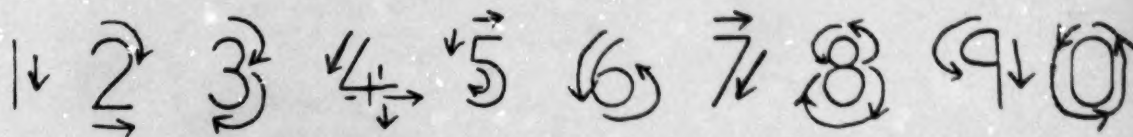
Begin at the top, go down, a big fat tummy and put a hat on.

Across and down



Round, across, round down and up and across and round to join.

"Instructions" can accompany every symbol.



In 'Mathematics in Primary Schools - Curriculum Bulletin No. 1' the following activity is described: 'In an Infant classroom number boxes each bearing a large numeral (1 to 10) were prepared, placed in sequence and filled each morning with as many objects as were indicated by the numeral attached to each. Each day the objects in each box were changed according to the choice made by different children.



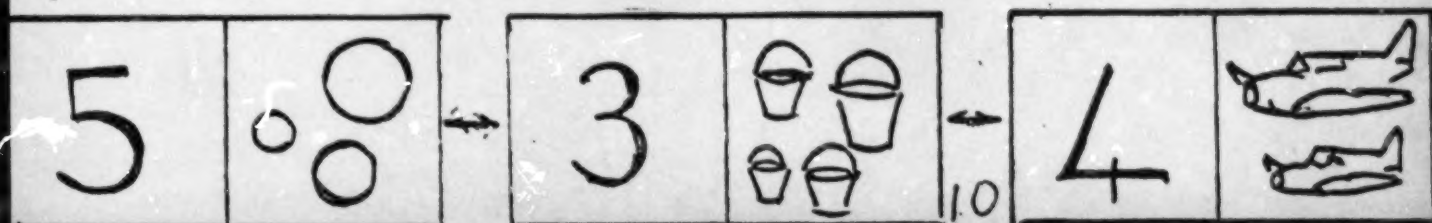
- (i) Number boxes placed in sequence and clearly labelled with large numerals.
- (ii) Items corresponding to each numeral selected by different children and changed each day.

This simple activity, undertaken over an extended period of time, is particularly valuable as children abstract the common property of differing sets of the same numerical size. The varied selection of objects used and daily exchange by the children themselves demonstrates that number is unaffected by size, shape, colour or distribution of objects forming any set. As an initial step activities of this kind have a marked advantage over the use of the pictorial wall frieze, or matching number plaques, where number is often associated with a static pattern of like objects, such apparatus being designed to consolidate rather than develop the number concept.

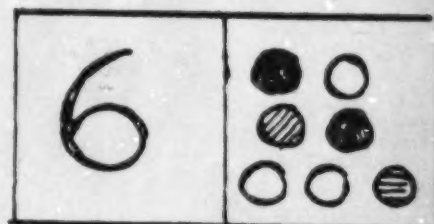
Number recognition apparatus: Consolidation games.

1. Number Dominoes Played as traditional dominoes, children being required to match numerals with pictorial representation as games proceed.

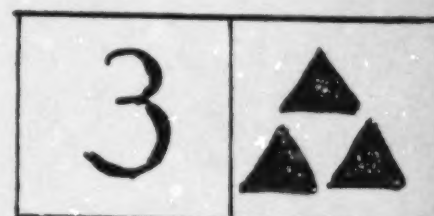
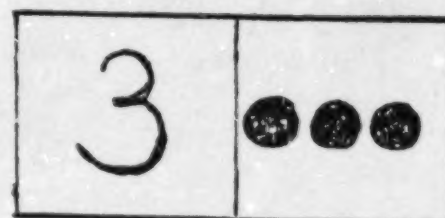
Set A. Picture sets of similar objects of differing size



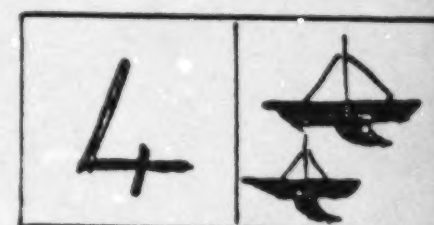
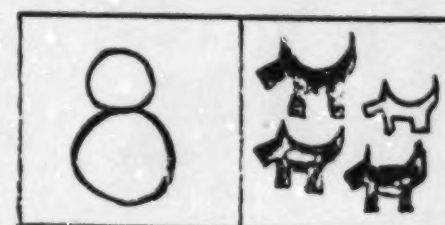
Set B. Picture sets of similar objects of differing colour



Set C. Picture sets of objects with varied distribution (in varying array)

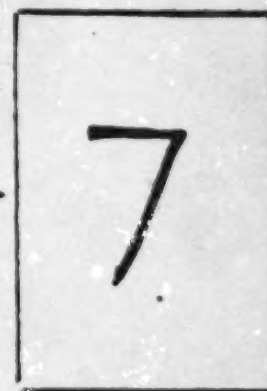
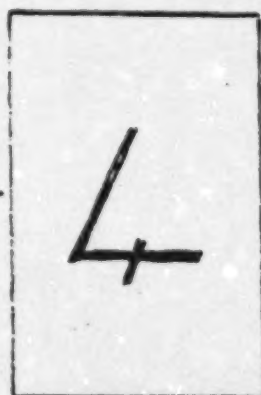
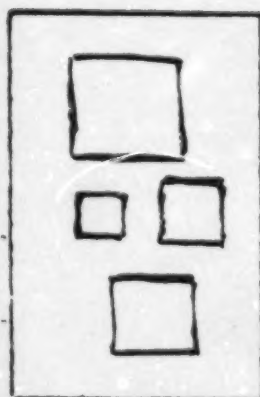


Set D. Picture sets of objects of varied SIZE, SHAPE, COLOUR and DISTRIBUTION.



2. Number Snap Cards

Sets of picture cards to be matched with the appropriate numeral. Picture cards feature variety of objects of differing size, colour and array.



3. Jigged Number Plaques.

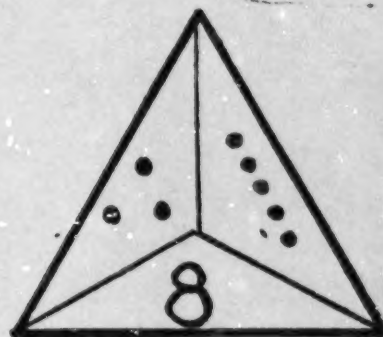
Self corrective jigged number plaques featuring numerals 1 to 10, number words and matching pictures.



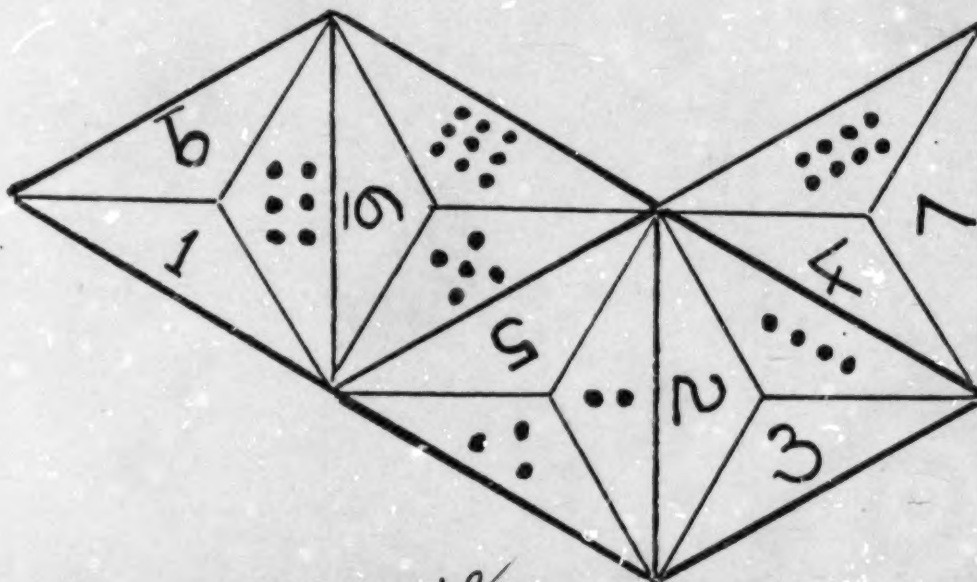
4. Matching Number Shapes.

The game consists of triangular shaped pieces each with numerals and arrays of dots.

Example.

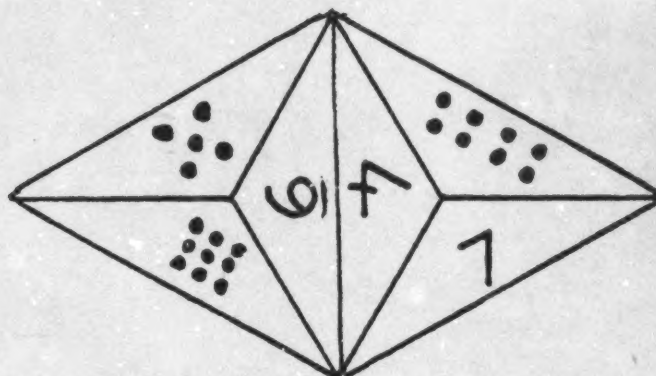
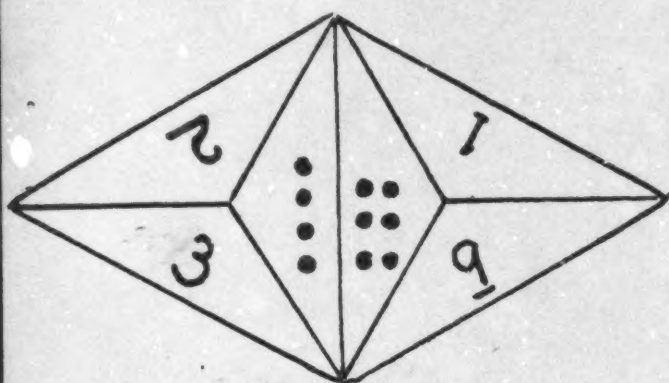


When using the apparatus children are required to match any numeral with a corresponding array of dots. The shapes are connected on all sides as the game proceeds.



At a later stage this apparatus may also be used as a NUMBER BOND TO TEN linking game.

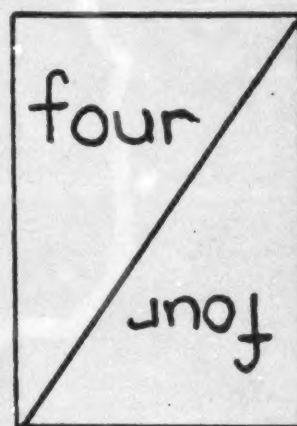
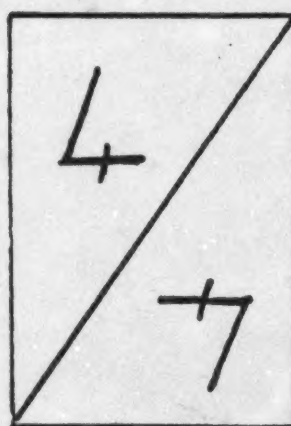
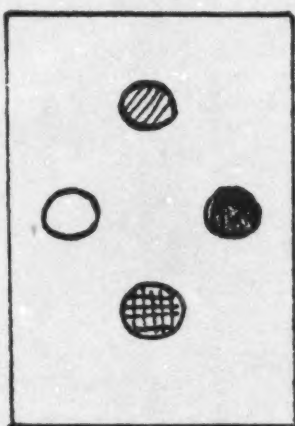
Example:



5. Number Playing Cards

The set comprises 40 cards prepared in TEN matching sets of four.

Each set of four cards features pictures, shapes, numerals and the matching number name.



As the game proceeds players are required to collect a set of four cards displaying corresponding values expressed in the form of pictures, shape diagrams, numerals and number words.

The 40 cards are shuffled before each game.

Each player is dealt FIVE cards the remaining card being placed in a face down remainder pack on the playing surface. The top card of this remainder pack is turned over to give a double choice of exchange as the game proceeds. Players take turns at picking up one card from either remainder pack. This card is exchanged for any unwanted card held, the rejected card being placed on the 'face up' pack each time. Play continues until one player gains a complete set of four corresponding values and is declared the winner. The cards may also be used in the manner of traditional 'SNAP' until all cards are held by one player.

Individual children may also use the cards as a number matching activity.

NUMBER APPARATUS:

E.J. Arnold & Son Ltd.

KG 912 Number Frieze Cards 1 - 10
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KT 379 Number Jigsaws
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T 398 How Many?
T 366 Ordering Cubes
T 481 Number - picture matching

E.S.A.

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9886/648 Mathematical Farm
8711/011) Number Sorting Trays
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